Name_____

MATH 152H Exam 2 Spring 2017

Sections 203/204 (circle one) P. Yasskin

1-8	/40	10	/20
9	/15	11	/25
		Total	/100

Multiple Choice: (5 points each. No part credit.)

1. Find the arc length of the curve $(x,y) = \left(\frac{1}{2}t^6, t^4\right)$ from $(0,0)$ to $\left(\frac{1}{2},1\right)$.

a. $\frac{10}{9}$

b. $\frac{5}{9}$

c. $\frac{61}{54}$

d. $\frac{1}{54}$

e. $\frac{1}{6}$

2. The parabola $y = x^2$ for $0 \le x \le \sqrt{2}$ is revolved about the y-axis. Find the surface area swept out.

a. $\frac{13\pi}{3}$

b. $\frac{13\pi}{6}$

c. $\frac{13\pi}{9}$

d. $\frac{26\pi}{3}$

e. $\frac{26\pi}{9}$

3. Find the general partial fraction expansion of $f(x) = \dfrac{x-1}{(x^3+x)(x^4-1)}$.

a. $\dfrac{A}{x} + \dfrac{Bx+C}{x^2-1} + \dfrac{Dx+E}{x^2+1} + \dfrac{Fx+G}{(x^2+1)^2}$

b. $\dfrac{A}{x} + \dfrac{B}{x+1} + \dfrac{C}{x-1} + \dfrac{Dx+E}{(x^2+1)^2}$

c. $\dfrac{A}{x} + \dfrac{B}{x+1} + \dfrac{Cx+D}{(x^2+1)^2}$

d. $\dfrac{A}{x} + \dfrac{B}{x+1} + \dfrac{C}{x-1} + \dfrac{Dx+E}{x^2+1} + \dfrac{Fx+G}{(x^2+1)^2}$

e. $\dfrac{A}{x} + \dfrac{B}{x+1} + \dfrac{Cx+D}{x^2+1} + \dfrac{Ex+F}{(x^2+1)^2}$

4. In the partial fraction expansion $\dfrac{36x}{x^4-81} = \dfrac{Ax+B}{x^2+9} + \dfrac{C}{x+3} + \dfrac{D}{x-3}$, which coefficient is INCORRECT?

a. $A = -2$

b. $B = 6$

c. $C = 1$

d. $D = 1$

e. All of the above are correct.

5. The base of a solid is the region between the parabola $y = x^2$ and the line $y = 4$ and the crosssections perpendicular to the y-axis are squares. Find its volume

a. 4

b. 8

c. 16

d. 32

e. 64

6. The region bounded by the curves $y = x^4$, $y = 0$ and $x = 3$ is revolved about the y-axis. Find the volume swept out.

a. $3^7\pi$

b. $3^5\pi$

c. $3^3\pi$

d. $\frac{3^5}{5}\pi$

e. $\frac{486}{5}\pi$

7. The region bounded by the curves $y = x^4$, $y = 0$ and $x = 3$ is revolved about the x-axis. Find the volume swept out.

a. $3^7\pi$

b. $3^5\pi$

c. $3^3\pi$

d. $\frac{3^5}{5}\pi$

e. $\frac{486}{5}\pi$

8. Compute $\int_0^3 \frac{1}{(25-x^2)^{3/2}}dx$.

a. $\frac{3}{4}$

b. $\frac{3}{16}$

c. $\frac{3}{25}$

d. $\frac{3}{100}$

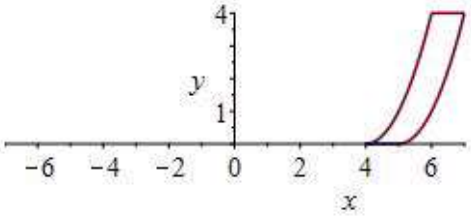
e. $\frac{3}{400}$

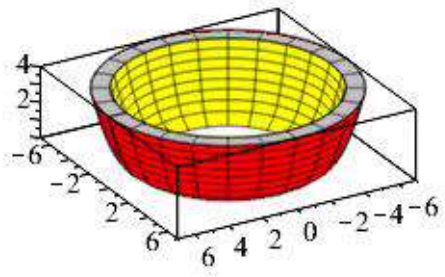
Work Out: (Points indicated. Part credit possible. Show all work.)

9. $(15$ points$)$ A water trough is 10 feet long and its end is an isosceles triangle with vertex down with height 4 feet and width 2 feet. The trough is filled with water to a depth of 3 feet. Find the work done to pump the water out of the trough to a height of 1 foot above the top of the trough. Assume the weight density of the water is $\rho = 64 \frac{\text{lb}}{\text{ft}^3}$

10. $(20$ points$)$ The region between the curves $x = 4 + \sqrt{y}$ and $x = 5 + \sqrt{y}$ for $0 \le y \le 4$ (shown below), is rotated about the y-axis to form the clay bowl (also shown below). (Ignore the fact that there is no base.) In the rotated figure, y is the vertical axis, the inner radius is $r_1 = 4 + \sqrt{y}$ and the outer radius is $r_2 = 5 + \sqrt{y}$.

Here y is measured in *cm* and the density of the clay used to make the bowl is $\delta = \frac{3}{2}\ \frac{gm}{cm^3}$.





a. Find the volume of clay used to make the bowl.

b. Find the mass of the clay used to make the bowl.

c. Find the y-component of the center of mass of the bowl.

11. (25 points) Given the partial fraction expansion $\frac{54x+54}{x^4-81} = \frac{2}{x-3} + \frac{1}{x+3} - \frac{3x+3}{x^2+9}$, compute $\int \frac{54x+54}{x^4-81}\,dx$.

a. $\int \frac{2}{x-3}\,dx =$

b. $\int \frac{1}{x+3}\,dx =$

c. $\int \frac{-3x}{x^2+9}\,dx =$

d. $\int \frac{-3}{x^2+9}\,dx =$

e. $\int \frac{54x+54}{x^4-81}\,dx =$