

Name _____

MATH 152H Exam 1 Spring 2017
Sections 203/204 (circle one) P. Yasskin

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

1-8	/40
9	/15
10	/15
11	/15
12	/15
Total	/100

1. Find the area between, $y = x^4$ and $y = 8x$.

- a. 20
- b. 12
- c. $\frac{112}{5}$
- d. $\frac{56}{5}$
- e. $\frac{48}{5}$

2. Find the area between the cubic $y = x^3 + x^2$ and the line $y = 2x$.

- a. $-\frac{27}{12}$
- b. $\frac{27}{12}$
- c. $\frac{37}{12}$
- d. $\frac{47}{12}$
- e. $\frac{57}{12}$

3. Compute $\int_1^e x^3 \ln x dx$

a. $\frac{1}{16}$

b. $\frac{1}{4}$

c. $\frac{3e^4}{16}$

d. $\frac{3e^4 + 1}{16}$

e. $\frac{3e^4 + 1}{4}$

4. Compute $\int_0^{\pi/6} \sin(2\theta) \cos^2(\theta) d\theta$

a. $\frac{-9}{32}$

b. $\frac{-1}{32}$

c. $\frac{7}{32}$

d. $\frac{9}{32}$

e. $\frac{15}{32}$

5. Find the mass of a 2 meter bar whose density is $\delta(x) = 4x - x^3$ where x is measured (in meters) from one end.
- a. 2
 - b. 4
 - c. 8
 - d. 16
 - e. 32
6. Find the center of mass of a 2 meter bar whose density is $\delta(x) = 4x - x^3$ where x is measured (in meters) from one end.
- a. $\frac{15}{16}$
 - b. $\frac{15}{64}$
 - c. $\frac{64}{15}$
 - d. $\frac{32}{15}$
 - e. $\frac{16}{15}$
7. Find the average density of a 2 meter bar whose density is $\delta(x) = 4x - x^3$ where x is measured (in meters) from one end.
- a. 2
 - b. 4
 - c. 8
 - d. 16
 - e. 32

8. Compute $\int_0^{\pi/4} \sec^4 \theta \tan^2 \theta d\theta$

- a. $-\frac{8}{15}$
- b. $-\frac{2}{15}$
- c. $\frac{2}{15}$
- d. $\frac{8}{15}$
- e. $\frac{128}{15}$

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

9. (15 points) Find the point (a, e^{2a}) on the graph of the curve $y = e^{2x}$ where the tangent line passes through the point $(b, 0)$ where b is a fixed but unspecified number.
HINT: In your answer, express a and the point in terms of b .

10. (15 points) Derive a reduction formula which gives

$$\int (\ln x)^n dx \text{ in terms of } \int (\ln x)^{n-1} dx \text{ and } \int (\ln x)^{n-2} dx.$$

HINT: You need to know $\int \ln x dx$.

11. (15 points) Compute $\int_1^4 \cos(\sqrt{x}) dx$.

a. First, compute $\int \cos(\sqrt{x}) dx$.

b. Check your answer by differentiating.

c. Compute $\int_1^4 \cos(\sqrt{x}) dx$.

12. (15 points) Compute $\int_{13}^{15} \frac{\sqrt{x^2 - 144}}{x} dx$.

a. First, compute $\int \frac{\sqrt{x^2 - 144}}{x} dx$. Be sure to explain why you picked the substitution you use.

b. Check your answer by differentiating.

c. Compute $\int_{13}^{15} \frac{\sqrt{x^2 - 144}}{x} dx$. Simplify. No decimals!