Math 171

Sample problems for Test 2. Answers.

1. $\frac{1}{2}$
2. $25e^{-5x}\cos(3x) + 30e^{-5x}\sin(3x) - 9e^{-5x}\cos(3x)$
3. (a.) 4

   (b.) $\log_2 6 = \frac{\ln 6}{\ln 2}$
4. $f'(x) = \frac{2x}{\sin^{-1}(x^2)\sqrt{1-x^4}}$
5. (a.) $f'(x) = \frac{\sqrt[3]{3x-1}\,(x-2)^3}{2\sqrt{x+1}}\left(\frac{1}{3x-1} + \frac{3}{x-2} - \frac{1}{2(x+1)}\right)$

   (b.) $f(x) = (x+x^2)^{\tan x}\left(\sec^2 x \ln(x+x^2) + \tan x \frac{1+2x}{x+x^2}\right)$
6. $\frac{3\pi}{4}$
7. $y' = \frac{y^2\sec^2 x - \cos(x+y)}{\cos(x+y) - 2y\tan x}$
8. Vector equation: $< x, y >=< 3, 0 > +t < 4, 2 >$. Parametric equations: $x = 3 + 4t$, $y = 2t$
9. . $\vec{v}(1) =< 1, 15 >$, $s(1) = \sqrt{226}$, $\vec{a}(1) =< 0, -10 >$
10. $y'' = 2\cos(3x) - 12x\sin(3x) + 9x^2\cos(3x)$
11. $f^{(54)}(x) = -54\sin x - x\cos x$
12. Slope of the tangent line equals $-\frac{12}{7}$ when $t = -1$ and $t = -\frac{4}{3}$. Point on the curve corresponding to $t = -1$ is $(-5, 6)$. Point on the curve corresponding to $t = -\frac{4}{3}$ is $(-\frac{208}{27}, \frac{32}{3})$.
13. -0.15 rad/s
14. $\frac{1}{80}$ m/min
15. ≈ 58.24
16. $\frac{1}{1+x^2} \approx \frac{1}{2} - \frac{1}{2}(x-1)$
17. $f'(x) = \frac{4x}{\sqrt{1+(\tan^{-1}(2x^2+3))^2}\,(1+(2x^2+3)^2)}$

18. (a.) $\frac{1}{2}$

(b.) 0

(c.) 1