Math 0220

Sample Final Exam

Answer Keys

1.

(a) $8h + 31$

(b) $8 \cdot 0.21 + 31 = 32.68$

(c) 31

2.

(a) $y = -\frac{1}{2}x + 1$

(b) 0.9

3.

(a) $f'(x) = 54(6x+5)^2(x^2-1)^4 + 24x(6x+5)^3(x^2-1)^3$

(b) $y' = \dfrac{3(e^{-x} - xe^{-x})(5+9x^2) - 54x^2e^{-x}}{(5+9x^2)^2}$

(c) $f'(x) = 12\cos(4x)\sin^2(4x)$

(d) $y' = \frac{1}{2}\left(\dfrac{2x+7}{x^2+7x+1} - \dfrac{12}{12x-7}\right)$

(e) $f'(x) = 4\sec^2(4x) + \dfrac{4}{1+16x^2}$

(f) $y' = \left(1+3e^{x/6}\right)^{1/x} \cdot \dfrac{\frac{1}{2}xe^{x/6} - 3e^{x/6} - 1}{x^2}$

(g) $f'(x) = 5\sqrt{25-x^2} - \dfrac{5x^2}{\sqrt{25-x^2}}$

(h) $f'(x) = \dfrac{1}{2\sqrt{x}}\cos^4(6\sqrt{x})\sin^4(8\sqrt{x})$

4.

(a) $\dfrac{4}{1+\pi}$

(b) $e^{-1/2}$

(c) 1

5.

(a) $-\frac{24}{5}$

(b) $-\frac{12}{13}$

6.

(a) CNs are 0, 2, 3; $f(0) = 0$, $f(2)$ DNE, $f(3) = 27$.

(b) IP is $(0, 0)$, vertical asymptote at $x = 2$, local minimum at $x = 3$.

(c) $+\infty$, $+\infty$

7. $r = \left(\dfrac{62.5}{\pi}\right)^{1/3}$, $h = \dfrac{62.5}{\pi\left(\frac{62.5}{\pi}\right)^{2/3}} = \left(\dfrac{62.5}{\pi^2}\right)^{1/3}$

8. $x_1 = 3\frac{4}{7}$

9. $y = -\frac{3}{4}x + 1$

10.

(a) $\pi + 18 - \dfrac{32\sqrt{2}}{3}$

(b) $\frac{3}{5}x^5 \ln x - \frac{3}{25}x^5 + C$

(c) $\frac{1}{2}\ln|x^2 + 2x + 7| + C$

(d) $-\frac{5}{8} \cdot \dfrac{1}{(4x+5)^2} + C$

(e) $\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 + C$

(f) $-\frac{7}{3}x\cos(3x) + \frac{7}{9}\sin(3x) + C$

11. π, -1

12. $f(2) = \pi$, $f(3) = \pi - 1$, $f(4) = \pi - 2$, $f(5) = \pi - 1$