Final Exam − Review − Answers

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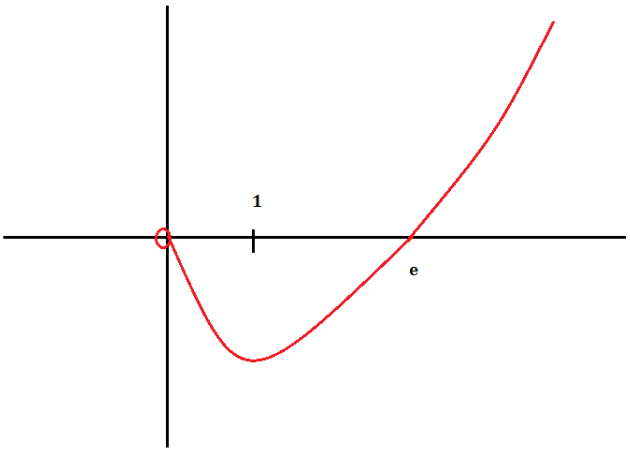
1 Part I

(1) 1A/Practice Exams/Mockgraph.png



(2) (a) 0 (Squeeze theorem)
(b) -1
(c) $\frac{1}{3}$
(d) 1

(3) $(\pm 2, 0)$

(4) $100\pi - 12$ mph

(5) See review session, use $\lim_{h\to 0} \frac{e^h - 1}{h} = 1$ by definition of e

(6) $y = x + 1$

2 Part II

(1) $\frac{7}{3}$ (see review session)

(2) 330

(3) $\frac{3}{8}$

(4) (a) $\frac{\pi}{2}$

(b) 0 (odd)

(c) $\frac{\left(\tan^{-1}(x)\right)^3}{3} + C$

(d) $\frac{56}{45}$

(e) $\frac{1}{8}\ln(4x^2+1) + \tan^{-1}(2x) + C$

(f) $\sqrt{2} - 1$

(5) $F(x) = \int_2^x \sin\left(t^2\right) dt + 3$

(6) $4x\cos(2x) - \sin^{-1}\left(e^x\right)e^x$

(7) Show that $I'(x) = 0$

(8) 72

3 Part III

(1) $\frac{\pi}{3}$

(2) $\frac{8\pi}{3}a^2$

(3) $\frac{3}{4\pi}$ units/min

(4) (a)

$$V = \pi \int_0^1 \left(2 - x^3\right)^2 - \left(2 - x^2\right)^2 dx$$

(b)

$$V = \pi \int_0^1 \left(x^2 + 1\right)^2 - \left(x^3 + 1\right)^2 dx$$

(c)

$$V = \pi \int_0^1 (\sqrt[3]{y} + 1)^2 - (\sqrt{y} + 1)^2 dy$$

(d)

$$V = \pi \int_0^1 (2 - \sqrt{y})^2 - (2 - \sqrt[3]{y})^2 dy$$

(5) $\frac{3\pi}{2}$

(6) $\frac{4\pi}{3}\left(R^2 - r^2\right)^{\frac{3}{2}}$

(7) $24\pi^2$